

Information transfer system, a transmitter , a receiver and a record carrier for use in the system.

The invention relates to an information transfer system, comprising a receiver and a transmitter for transferring an information signal to the receiver via a transfer medium, the information signal comprising main data and sub data, the sub data comprising coded text lines having a plurality of character codes, the receiver being
5 provided with a character display unit for displaying characters defined by the character codes in the coded text lines, which display unit has a predetermined number of character display positions.

The invention further relates to a transmitter, a receiver and a record carrier for use in the system.

10 A system as described in the opening paragraph is inter alia known from EP-A-0,325,325. In this patent application a system is described in which the information signal is transferred via a record carrier, e.g. a Compact Disc or a digital audio tape, to an audio player. The player is provided with at least one multi-line display unit for displaying text lines defined by the coded text lines included in the sub
15 data transferred. The number of character positions (digits) of the display unit is sufficient to display a full text line of forty characters. By means of the system additional information related to the main (audio) information reproduced can be displayed.

The full line display units are less suitable when small sized receivers,
20 such as e.g. portable players and car radios, are used in the system, because in general there is not enough space available for such full line display units. Full line display units are also less suitable to be used on the remote controllers of the receivers. On the other hand it is also desirable that on that type of receivers and remote controllers additional information related to the reproduced main information can be displayed.

25 It is an object of the invention to provide means which enables that significant parts of the text information available in the sub data can also be shown on display units on small-sized receivers and remote controllers without the requirement of far-reaching amendments in the sub data format.

According to the invention this object is achieved for a system described in the opening paragraph which is characterized in that said predetermined number of character positions of the display unit is less than the number of character codes in the coded text lines, in that the coded text lines include control codes, the receiver being
5 provided with display control means for controlling the display of characters corresponding to the character codes included in the coded text line in dependence on the said control codes.

In the system according to the invention the information already available in the coded text lines included in the sub data for displaying on a full line display unit,
10 can also be used for the display on a small sized display unit with a limited number of character positions. This has the advantage that the addition of coded text to the sub data for exclusive use in combination with a 1-line display with a limited number of digits is not required.

An embodiment of the system is characterized in that the receiver is
15 provided with means for storing received coded text lines into a memory, and in that the control codes comprises horizontal scrolling control codes, the display control means of the receiver being adapted to initiate in response to the horizontal control codes a horizontal scroll of the characters of the coded text line stored in the memory.

By using a combination of a memory and a scroll function a presentation
20 of the contents of a complete coded text line is possible.

A further embodiment of the system is characterized in that the receiver is provided with entry means for manually entering scroll commands, the display control means being adapted to control the scrolling in dependence on the entered scroll commands.

This embodiment has the advantage that the user himself can initiate a
25 scroll of the coded text line stored in the memory each time when he finds this desirable.

A further embodiment of the system is characterized in that the display control means are adapted to scroll the characters with a speed dependent on the scrolling control codes or the entered scrolling commands.

30 This embodiment enables an adaption of the scrolling speed on specific circumstances.

An other embodiment of the system is characterized in that the control codes comprises marking codes for marking groups of characters, the display control

means being provided with means for selecting the character codes for which corresponding characters are to be displayed on the basis of the marking codes.

This embodiment enables the presentation of the most significant words of a message on the display.

5 Preferably the groups of characters (character strings) to be displayed are placed between a start code and a pause code.

In that event it is preferred to use a system, characterized in that the display control means are adapted to cause a display of a space-type character in response to a pause code, whilst no display of corresponding character is caused for the start codes.

10 This embodiment enables a very suitable separation on the display unit between character strings which are not subsequent in the message defined by the coded text line.

A further embodiment of the system is characterized in that the sub information comprise text packets, each text packet comprise a coded text line and
15 additional control codes, a part of the text packets comprises an indicating control code indicating that the corresponding packet comprises a coded text line with text information to be displayed on the display unit with the limited display positions, the receiver is provided with means for preselecting text packets having a indicating control code, and means for exclusively supplying preselected text packets to the display control
20 means.

By the use of the pre-selection it is prevented that the display control means makes unnecessary searches in coded control lines which does not include characters to be displayed on the 1-line display unit.

The invention will now be described in more detail, by way of example,
25 with reference to the accompanying drawing, in which

Figure 1 shows an embodiment of the system according to the invention,
Figure 2 shows a suitable format of packets for transferring the coded text lines,

Figure 3 shows an example of parallel control codes included in the
30 packets,

Figure 4 shows examples of serial control codes which may included in the coded text lines,

Figure 5 shows, by way of example, how the packets can be incorporated

in the sub data of a digital compact cassette,

Figure 6 shows an embodiment of an sub data processing unit for use in the system according to the invention,

Figure 7, shows embodiments of a display control unit an display unit for
5 use in the system according to the invention,

Figures 8a, 8b, 8c and 8d show different coded text lines and character strings displayed in response to the receipt of these coded text lines, and

Figure 9 shows a possible relation between the character codes and corresponding characters.

10 Figure 1 shows, by way of example, an embodiment of a information transfer system according to the invention. The system comprises a transmitter 1 for transferring an information signal to a receiver 2 via a transfer medium 3. The transmitter 1 comprises a usual source 4 of main data, e.g. digital audio information. The transmitter 1 further comprises a source 5 of sub data related to the main
15 information. The sub data comprises coded text lines and additional control codes. The main data and sub data are supplied to an output stage 6 which transfers the main and sub data in a suitable signal format to the transfer medium 2. The receiver 3 comprises an input stage 6a for receiving the information signal transferred via the transfer medium 2. The input stage 6a separates the main data and sub information. The main
20 data is supplied to a main data processing unit 7 of a usual type for processing the main data. The sub data is supplied to a sub data processing unit 8 for processing the sub data. The sub data processing unit supplies coded text lines and corresponding control codes to a display control circuit 9 of a 1-line display unit 10 having a limited number of character positions (digits), e.g. a 12-digit display unit. The display control circuit 9
25 controls the display of characters defined by character codes included in the coded text lines in dependence on control codes also included in the coded text lines.

The information transfer system can be of type in which the sub data is arranged in packets. In this packets coded text lines can be included. Packets including a coded text line will be indicated as text packets hereinafter. Each coded text line
30 consists of a sequence of a predetermined number of codes. According to the invention the coded text lines comprises character codes defining a character to be displayed and control codes for controlling the display of character strings on a 1-line display with a number of digits which is not sufficient to display a complete text line at once. The

control codes included in the coded text line will be indicated as serial control codes hereinafter. The packets may further comprise additional codes not included in the code text line. These control codes will be indicated as parallel control codes hereinafter. A suitable format of the packets is described in detail in EP-A-0,325,325 and EP-A-0,389,689 which documents herewith are incorporated in the description by reference. The transfer medium may be a Compact Disc on which digital main (audio) data is recorded and in which the packets with coded text lines are included in the so-called R to W subcode channels. The transfer medium may also be formed by a so-called Digital Compact Cassette in which main data, in the form of compressed audio information, and sub data are recorded on a magnetic tape. The packets including the coded text lines may be included in the sub data recorded on the Digital Compact Cassette. For a more detailed description of a digital compact cassette system reference is made to EP-A 0,436,991 (PHN13209), which document is herewith incorporated in the description by reference. Figure 5 shows, by way of example, how packets can be incorporated in the sub data format of the Digital Compact Cassette-system described in EP-A 0,436,991 (PHN13209).

The transfer medium 3 may also be formed by a digital audio broadcast channel via which a digital audio signal and packets including coded text lines are transferred. For a more detailed description of such broadcast system reference is made to EP-A-0,389,689.

Figure 2 shows a suitable format of a text packet. The text packet shown comprises forty eight bytes of eight bits each. The first eight bytes are used for the transfer of parallel control codes. The parallel control codes comprise positions codes 21PC and 2PC. The position code 21PC indicates the line position on which the corresponding text line is to be displayed on a 21-lines display. The position code 2PC indicates the line position of the corresponding text line in the event a 2-line display is used. The parallel control codes comprise three control codes which are used for selecting specific text packets from the text packets received. These control codes are indicated as LN (language number), AC (application code) and TC (topic code). The code LN indicates the language of the coded text in the corresponding text packet. The code AP indicates whether the coded text line comprises information to be displayed on the 1-line display unit 10. The code TC indicates the topic to which the corresponding text line relates. Such topics may be e.g. "Album Information", "Performers name" or

"The text of the reproduced song".

In the text packet forty bytes (bytes 8-47) are used for transferring the codes TLC0,...,TLC40 of the coded text line. The codes may comprise a character code defining a character of a character set. The codes may also comprise serial control codes for the control of the display. Figure 9 shows the relation between the code values (hexadecimal) and the corresponding characters. The codes in columns 0x, 1x, 8x and 9x are reserved for the control codes. Figure 4 shows an overview of the serial control codes used in the embodiment described. Figure 4 shows two marking codes for marking groups of character codes to be used for displaying a text string. These marking codes comprises a start control code S, which is used to indicate the begin of a text string to be displayed on the 1-line display unit, and a control code P, which is used to indicate the end of a text string to be displayed on the 1-line display unit. Scrolling control codes H0, H1, H2 and H3 with the code values 19, 1A, 1B, and 1C are used for initiating a horizontal scroll with four different scrolling speeds.

Figure 6 shows an embodiment of the sub data processing unit 8. The unit 8 comprises a memory in the form of a shift register 60 in which the bytes of the packets received from the input stage 6a are shifted in synchronism with a clock signal cl1 received from a timing control unit 61 of a usual type. The unit 8 is further provided with code coincidence detecting circuits 62, 63 and 64. The code coincidence detecting circuits 62 and 64 are provided with inputs 66 and 67 for receiving a user selected value for the language selection code LN and topic selection code TC from a user selection entry unit 68 of usual type, e.g. an operation panel with selection keys. The code coincidence detecting circuit 63 has an input 72 for receiving a code value corresponding with the code value of AP indicating that the corresponding coded text line comprises information to be displayed on the 1-line display unit 10. Inputs 69, 70 and 71 of the code coincidence detecting circuits 62, 63 and 64 are coupled with parallel outputs of the shift register 60 such that at the moment that the first byte of a received text packet reaches the serial output 65 of the shift register the values of the codes LN, AC and TC are supplied to the code coincidence detecting circuits 62, 63 and 64 respectively. The code coincidence detecting circuits 62, 63 and 64 are provided with outputs 73, 74 and 75 for supplying corresponding detection signals to a gate circuit 76 in the events that a coincidences between the code values on the inputs of the circuits 62, 63 and 64 are detected. The gate circuit 76 is of a usual type that under

- the text is scrolled once, after which the text marked by the start control code S and the pause control code P controls is shown on the display.
- the text as marked by the control codes S and P is shown first for a (device dependent) period of time, after which one of the above mentioned scrolling methods starts.

The scrolling may also be controlled manually. This means the text as marked by the S and P is displayed until a user's scroll command is received. Depending on the design of the hardware various reactions on a user's scroll command may be implemented, e.g.:

- 10 - the text is scrolled once, after which the end of the text is left on the display. This method is to be used for text lines of which the Packet Index equals "00 00h".
- the text is scrolled once, after which the beginning of the text is shown again on the display.
- 15 - the text is scrolled once, after which the text marked by the control codes S and P is shown on the display.

The embodiment of the receiver as described hereinbefore is realized as a so-called hard-wired circuit. However it will be clear to the skilled man that embodiments realized by means of so-called programm controlled circuits are also possible. Further it is to be noted that the invention is not limited to the use of the serial control codes as described. Other serial control codes for the control of the representation of character strings on a 1-line display with a limited number of digits are also possible. Further the response of the display control unit on the serial control codes may be different.

25 Finally it is remarked that the display unit may be incorporated in a remote controller of the receiver 1.